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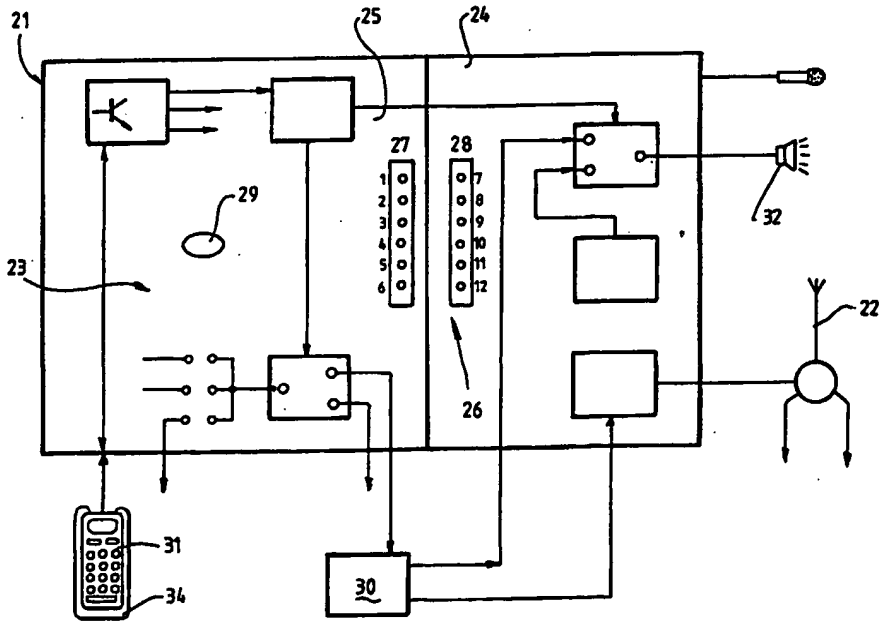

(57) Abstract

Au audio integrator module (21) that is connected to a mobile telephone hands free car system kit and the vehicle stereo/radio (30) has means whereby when an outward or inward telephone call is made from or to the mobile telephone, the stereo is disconnected from its speaker (32), thus muting the sound from the stereo/radio and the mobile telephone reception is connected to the stereo/radio speakers so that the incoming signal is received through the stereo/radio speaker.

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AUDIO INTEGRATOR MODULE

BACKGROUND TO THE INVENTION

This invention relates to an Audio Integrator Module and in particular, to an Audio Integrator Module that is to be used in association with a mobile telephone and a hands free car system kit.

Hands free car system kits to be used in association with mobile telephones were developed to overcome problems associated with drivers of vehicles using a hand held mobile telephone whilst driving. It was and still is believed that use of a hand held use of a mobile telephone whilst driving leads to driver distraction. More importantly, in Australia it is illegal to use a hand held mobile telephone whilst operating a vehicle as a driver using a hand held mobile telephone whilst driving does not have both hands free, and therefore would not be fully in control of the vehicle should a hazardous situation occur.

A common problem associated with hands free system kits for mobile telephones is that when a mobile telephone user either makes a telephone call, or receives a telephone call, they are required to turn down or switch off the vehicle stereo/radio to enable them to hear the person on the other end of the mobile telephone properly. The action of physically reaching over to turn down or switch off the stereo/radio adds to driver distraction at the time of answering or making the telephone call.

In an attempt to provide a solution to this problem there is a product on the market which is connected to the stereo/radio and operates by automatically adjusting the front or rear speaker volume of the stereo/radio when the mobile telephone is in use. Trial and use of this product has shown that if the speaker volume prior to the telephone call is very high, then the automatic reduction in the speaker volume is not adequate and the user must still either turn down or turn off the stereo/radio. Therefore in these situations the current product does not fulfill its intended purpose.

SUMMARY OF THE INVENTION

The object of the present invention is to provide an Audio Integrator Module that mutes the vehicle stereo/radio and which directs the audio from any hands free system to the existing vehicle speaker.

The invention, in its broadest sense, includes an Audio Integrator Module that is connected to a mobile telephone hands free car system kit and the vehicle stereo/radio has means whereby when an outward or inward telephone call is made from or to the mobile telephone, the stereo is disconnected from its speaker, thus muting the sound from the stereo/radio and the mobile telephone reception is connected to the stereo/radio speaker so that the incoming signal is received through the stereo/radio speaker.

In order that the invention may be more readily understood we shall describe one particular form of the audio integrator module made in accordance with the invention with reference to the accompanying drawings, in which:

Fig 1. Is a schematic diagram of the audio integrator module

The Audio Integrator Module(21) may be arranged so that where there is an electrically operated antenna(22), that power is maintained to the antenna.

The Audio Integrator Module(21) may have circuitry(23) which can be incorporated into a cube or solid rectangle of an epoxy or the like so that the circuitry is "potted" and not able to readily be accessed, which circuitry may be divided into two sections, an Audio Control Section(24) and a Power Control Section(25).

In one form of the invention it may be desirable that the Audio Integrator Module(21) is in the form of a single component which has a plurality of pins(26) where the Audio Control Section(24) and the Power Control Section(25) are positioned along opposite sides of the module(21).

In a preferred form of the invention the Audio Integrator Module(21) is a single component which consists of twelve pins(26) that are in two groups; Power Control Group(27) and Audio Control Group(28). The module also has an LED(29) which is lit-up when the module(21) is triggered. For ease of installation and identification of the Power Control Section(25) and the Audio Control Section(24), we have placed the LED(29) off centre near the row of Power Control Group pins(26).

In a preferred form of the invention the Audio Control Section(24) consists of six connection pins(26) that operate as per the table below.

TABLE 1

Audio Control Connections

Pin	Terminal Designators	Function
1	Speaker	Connect to Positive (+) input of speaker
2	Speaker	Connect to Negative (-) input of speaker
3	High Frequency Audio	Connect to Positive (+) Audio output form hands free unit
4	High Frequency Audio	Connect to Negative (-) Audio output form hands free unit
5	Radio Audio	Connect to Positive (+) Audio from car radio
6	Radio Audio	Connect to Negative (-) Audio from car radio

*Note: The polarity of these connections will not effect the operation of the module but it is goods practice to maintain the correct polarity of the sound system.

In this preferred form of the invention the Power Control Section(25) also consists of six connection pins(26) that operate as per the table below.

TABLE 2

Power Control Connections

Pin	Terminal Designators	Function
7	12V	Connect to any Permanent or Switched 12 Volt Source
8	0V	Connect to any Ground, Negative or Chassis
9	TRIG	Connect to Trigger output from hands free unit
10	N/C	Normally Closed*
11	Comm	Common Connection*
12	N/O	Normally Open*

*Note: See option list to select appropriate configuration

As there are various stereo/radios on the market, with or without a mute function, the table below describes the different connection options for Pins 10, 11 or 12.

TABLE 3

Connection Options for Pin 10, 11 and 12

Option	Application	Action
Option 1	Standard Radio with no radio mute input.	Cut radio accessories wire and connect ignition side to **Pin 10 N/C** connect radio side to **Comm.**
Option 2	Standard radio with negative (-) triggered mute input.	Connect **Ground, Negative** or **Chassis** to **Comm** and negative (-) radio mute input to **pin 12 N/O**
Option 3	Standard radio with positive triggered radio mute input.	Connect + **12 Volts** to **pin 12 N/O** and positive (+) radio mute input to **pin 11 Comm.**

*Note: this device is designed to suit standard non-power boosted audio systems. (Max. Power dissipation 60Wpk) for high power systems use the H.P. Audio Integrator Module.

Connection option 1 would be used for a standard stereo/radio(30) which has no mute function.

Connections 2 and 3 would be used for stereo/radios(30) that have a mute function but which are, depending on age, may be wired differently to each other.

In the preferred form of the invention the Audio Integrator Module(21) in installed to automatically control the stereo/radio(30) of the vehicle whilst a hand held mobile telephone(31) is in operation via the hands free system kit(34).

When there is an incoming call, or the user wishes to make a call, the user presses the send/OK key to receive or make the telephone call. When the send/OK key is pressed this activates the module(21) and the accessories power to the stereo/radio(30) is switched off and the audio from the hands free system kit(34) is directed through the vehicle's existing speaker(32). To terminate calls on the other hand, the user of the mobile phone(31), presses the end/no key, the accessories power to the stereo/radio(30) is switched on, and the audio of the stereo/radio(30) emits back through the speaker(32).

This improvement over the prior art is beneficial to the user as it eliminates the possibility of having to physically reach over and turn down or off the stereo/radio(30) during a telephone call as mentioned herein above.

Many modern vehicles nowadays have safety and security features installed to prevent damage to or theft from the vehicle. One such feature is the automatic vehicle antenna(22), which is powered by the vehicle's 12 Volt battery. When the stereo/radio(30) is turned on, the antenna(22) goes up, and when the stereo/radio(30) or the car is turned off the antenna(22) goes down.

In a further embodiment of the invention the module(21) can also override the electronic componentry that controls the antenna, therefore the antenna(22) does not go up and down every time a call is made or received.

Whilst several embodiments of the invention have been discussed, it is to be understood that various modifications can be made therein without departing from the spirit and scope of the invention.

The Claims defining the invention are as follows:

1. An audio integrator module that is connected to a mobile telephone hands free car system kit and the vehicle stereo/radio has means whereby when an outward or inward telephone call is made from or to the mobile telephone, the stereo is disconnected from its speaker, thus muting the sound from the stereo/radio and the mobile telephone reception is connected to the stereo/radio speaker so that the incoming signal is received through the stereo/radio speaker.

2. An audio integrator module as claimed in claim 1 wherein the module is arranged in such a way so that in the presence of an electrically operated antenna, power is maintained to the antenna.

3. An audio integrator module as claimed in claim 2 wherein the circuitry can be incorporated into a solid figure of an epoxy or the like so that the circuitry is not easily identifiable and hence not able to be readily accessed.

4. An audio integrator module as claim 3 wherein the circuitry is divided into atleast two sections comprising an audio control section and a power control section.

5. An audio integrator module as claimed in claims 1-5 wherein the module is a single component comprising a plurality of pins and the audio control section and power control section are positioned opposite to one another.

6. An audio integrator module wherein a sclaimed in claim 5 wherein the pins are separated into groups of two: being power control pins and audio control pins.

7. An audio module integrator as claimed in claim 6 wherein the module comprises an LED which is illuminated when the module is triggered.

8. An audio integrator module as claimed in claim 7 wherein the LED is positioned off centre in close proximity to the power control section pins.

9. An audio integrator module as claimed in any previous claim wherein the audio control section comprises atleast six connection pins that function as provided in Table 1.

10. An audio integrator module as claimed in Claim 9 wherein the power control section comprises atleast six connection pins that function as provided in Table 2.

11. An audio integrator module as claimed in Claim 10 wherein connection pins 10, 11 and 12 comprising power control pins described in Tables 2 and 3 make reference to various connection options for car stereos/radios with or without mute functions.

12. An audio integrator module as claimed in Claim 11 wherein connection option 1 referrred to in Table 3 can be applied where a stereo/radio has no mute function.

13. An audio integrator module as claimed in Claim 12 wherein connection options 2 and 3 can both be applied where the stereo/radio has a mute function.

14. An audio integrator module as claimed in any preceding claim wherein the module is installed in a vehicle, such module functioning to automatically control the functioning of a stereo/radio of the vehicle whilst a hand held mobile telephone is in operation, via a mobile telephone hands free system.

15. An audio integrator module as claimed in claim 14 wherein the module is activated by the user of a mobile phone, said phone being located in a vehicle, pressing the send/ok function key on the mobile phone, resulting in the accessories power to the stereo/radio being switched off, and the audio from the hand free system is directed through the vehicle's speaker.

16. An audio integrator module as claimed in claim 15 wherein the module can override the electronic componentry that controls a vehicles antenna, therefore stopping the vehicle antenna from going up and down everytime a call is made or received.

17. An audio integrator nmodule as here-in-before described with reference to the accompanying drawing.

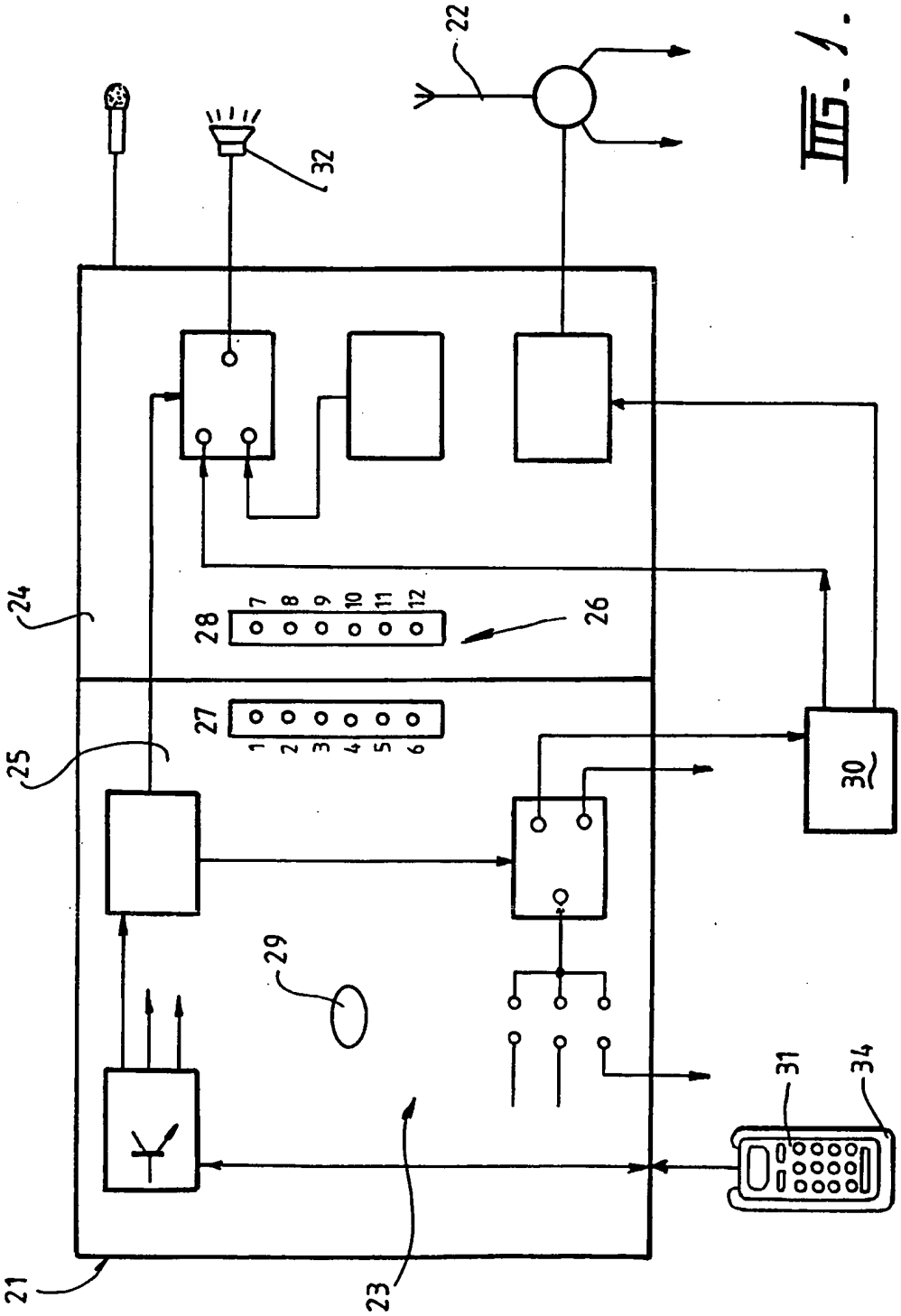

FIG. 1.